CABLE ARMOR STRIPPER

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The invention relates to a cable sheath cutter for stripping the insulation or like sheath from electrical cables.

Description of Prior Art

[0002] Cables and, particularly, power cables are conventionally formed with insulated inner strands surrounded by a metallic sheath, which is usually corrugated. In order to terminate, to test, to join and to repair such cables, the outer sheath must be stripped away so that lengths of the inner strands can be exposed, inspected, separated and worked on as required.

[0003] Typically, a cable cutter includes a handle carrying a cutting blade projecting from a shoulder at one end of the handle, and a cable clamp, which extends transversely of that end and which is spring urged towards the handle. In use, the cable is located between the clamp and cutter and the spring urges the cable so that the blade penetrates the sheath until the shoulder abuts the sheath. The tool is then rotated about the axis of the cable to make a peripheral cut, which enables the sheath to be peeled off the core or conductors of the cable.

[0004] In general, the cable cutter of the type described above has rather a complicated force transmission mechanism translating a force applied either manually or by a rotary motor into rotational motion of the blade. Sometimes, such a structure has substantial dimensions rendering the cable cutter inconvenient in use. This inconvenience is even more noticeable due to the geometry of the cable cutter and particularly to its frontal cable engaging area, which is typically relatively large.

[0005] A need therefore exists in a manually or battery operated cable cutter capable of effectively producing cuts even in confined areas.

SUMMARY OF THE INVENTION

[0006] A cable armor stripper provided with an adjustable frontal area, which is configured to reliably engage differently dimensioned cables and to produce uniform cuts in confined areas, meets this need.

[0007] The inventive cable armor stripper is ergonomically configured to have a two-lever assembly providing a support for the cable to be stripped, a blade and blade actuating assembly, as well as for a cable adjustment mechanism structured to adjust the desired space between the cable support and the blade. The structure of the inventive device is characterized by the following advantages:

Compactness;

Simplicity; and

Ability to produce a uniform cutting force resulting in the uniformly deep cut.

[0008] It is, therefore, one of the objects of the invention to provide a cable armor stripper with a simple and effectively operating structure;

[0009] A further object of the invention is to provide a cable armor stripper with a structure allowing the user to operate the inventive cable armor stripper effectively in confined areas;

[00010] Still a further object of the invention is to provide a cable armor stripper with a simply structured cable support mechanism allowing the user to grip variously dimensioned cables in a simple and reliable manner.

BRIEF DESCRIPTION OF THE DRAWINGS

[00011] The above and other features, advantages and object will become more readily apparent from the following specific description accompanied by a set of drawings, in which:

[00012] FIG. 1 is an isometric view of a manually actuated motorized cable armor stripper configured in accordance with one embodiment of the invention;

[00013] FIG. 2 is a cross-sectional view of the cable armor stripper of FIG. 1; and

[00014] FIG. 3 is an isometric view of a motorized cable armor stripper configured in accordance with a further embodiment of the invention.

[00015] FIG. 4 is a bottom view of a motorized cable armor configured in accordance with another embodiment of the invention.

SPECIFIC DESCRIPTION

[00016] Referring to FIGS. 1-2, a manually operated cable armor stripper 10 has an elongated body 12 provided on its proximal end with a folding lever 16 transmitting a user applied torque, as indicated by arrow T (FIG. 1), to a rotary blade 14 via a central shaft 18. Depending on the geometry of teeth provided on the blade 14, the cable stripper 10 may be provided with a ratchet mechanism configured to provide rotation of the central shaft 18 in one sense, or may have the folding lever 16 directly actuate the shaft 18 in opposite directions.

[00017] The ratchet mechanism includes a ratchet lever 20 formed integrally with a ratchet 26 and a ratchet shaft 22, which is provided with an array of teeth 25 meshing with the teeth 25 of the ratchet shaft 22. The teeth are so configured that rotation of the ratchet lever is translated to central shaft only in one or cutting direction of the blade resulting in a longitudinal cut along the armor. To ensure the desired position of the ratchet 26, it is biased towards a distal end of the body 12 by a spring 24 braced against a central shaft 18 and the ratchet lever 20. Rocking the folding lever 16 in a direction opposite to the cutting one disengages the ratchet lever from the ratchet shaft, which is rotatably fixed to the central shaft 18 by a pin 45. In use, therefore, upon pivoting the folding lever about fulcrum 42 so that it extends substantially perpendicular to the shafts, the user reciprocally rocks the folding lever 16 producing, thus, a longitudinal cut every time the folding lever rotates in the cutting direction. Proper positioning of the folding lever 16 with respect to the ratchet lever 20 during rocking is realized by a second spring 30 placed in one of these two levers and pressing against a ball 32, which is received in the other lever.

[00018] Another embodiment of the motion transmitting mechanism includes a structure, in which the blade 14 has so called isometric teeth allowing the blade to cut in opposite directions. This configuration does not require a ratchet mechanism and includes the folding lever 16 directly coupled to the central shaft 18. In use, thus, rotation of the folding lever 16 in either direction actuates the blade 14

[00019] The housing 28 is generally configured as an elongated sleeve made from a variety of materials including various metals and plastic structures. End couplers 32, 34 mounted on opposite proximal 36 and distal 38 ends of the housing 28, respectively, secure the central shaft 18 and the blade 14 against axial displacement within the housing 28. While the housing 28 can be made in one piece, it is preferred to assemble it using multiple parts or portions, wherein the distal end 38 of the housing 28 is provided with a blade guard 40 extending from this distal end radially outwards to accommodate the blade 14.

[00020] A cable support and blade penetration assembly 46 (FIG. 1) is provided with a clamp 44, configured to receive differently dimensioned armored cables, and with a blade actuating assembly 48, which includes a body support 50 and a handle 52. The body support 50 extends along the body 12 and is shaped with an inner surface 54 extending substantially complementary to a body segment, which is juxtaposed with this surface, and removably attached thereto at 56 (FIG. 1) by its proximal end. The distal end of the support 50 is coupled to the clamp 44 and is biased away from the distal end of the body 18 by a resilient element 58, such a compression spring or a leaf spring. Upon applying a compressive force to the distal ends of the support 50 and the body 18, the user can overcome the spring force and displace the distal ends towards one another so that the blade 14 would extend through a slit 60 of the clamp 44, as explained below. According to one modification, the clamp and the body support may be formed as a one-piece element. Alternatively, the body support is removably mounted to the rear side of the clamp, as shown in FIGS. 1 and 2.

[00021] To prevent uncontrollable displacement of the blade 14, which may result in an overly deep cut damaging the cable, a stopper 58 formed either on the handle 52 or the body 18

extends therebetween and presses thereagainst by its opposite ends in the desired cutting position of the blade 14. As is shown in FIG. 2, the stopper 58 is rotatably mounted on the clamp 44 and, thus, terminates at a distance from the handle 52 in a rest position when no force is applied to the body 18. Rotating the stopper 58 relative to the body 18 varies a distance between its free end and the handle 52 in the rest position of the blade 14 and establishes the desired blade penetration. Any other structure of the stopper, such as a telescopic one, can be used as well. In use, upon gripping the body 18 and the handle 52, a force generated by the user causes displacement between the body 18 and the handle, which, in turn, brings the blade through the slit 60, until the free end of the stopper 58 abuts the handle. Such abutment corresponds to a cutting position of the blade 14, in which the latter protrudes through the slit 60 of the clamp 44 into the cable at the desired distance sufficient to slit only the cable's armor.

[00022] Variously directed bending forces accompany compression of the body 18 and the handle 52, which is pivotally attached by its distal end to the clamp 44. To accommodate these forces and allow the body 18, the support 50 and the handle 52 to establish the cutting position of the blade 14, the handle is made from a flexible material. Flexibility of the handle allows its distal end 66 (FIG. 2) to keep transferring the external force after the proximal end 64 of the handle has contacted the outer surface of the support 50. As a result, the distal ends of the body 18 and support 50 continue to move towards one another until the blade 14, attached to the distal end of the body 18, is displaced to its cutting position. Linearity of the displacement of the body 18 is provided by a pair of rails 88 (FIG.1) fixed to the clamp 44 and extending through channels formed in the blade guard 40.

[00023] The handle 52 may be made from steel or any other flexible material acting as a leaf spring 62 having its proximal end 64 angled to urge against the body support 50 before the distal end of the handle is brought into contact with the stopper 58. For the user's convenience, the leaf spring 62 is enveloped in a plastic cover ergonomically configured to conveniently fit the user's hand.

[00024] Securement of the cable within a front channel 68 of the clamp 44, which is formed between relatively narrow 78 and relatively wide 76 jaws of the clamp, is provided by a

head 72 of a stud 70 coupled to the end 66 of the handle 52. As the handle 52 moves towards the body 18 after positioning the cable in the front channel 68, the head 72 of the stud 70 protrudes from the jaw 76 and presses against the cable topped by the jaw 78 in the cutting position of the blade 14. To control a distance at which the head 72 extends in a space between the jaws 76 and 78 to engage differently sized cables, the threaded outer end 71 of the stud extends through a bore formed the handle 58 and can be operated by a screwdriver. The jaw 76 has a central rib 74 recessed to form a guide for correct linear displacement of the head 72 towards the cable. The handle 52 is biased away from the body support 50 by a spring 80 braced between the outer side of the relatively wide jaw 76 and the head of the stud 70, which may be removably or permanently mounted to the handle 52. When the external force is ceased, the blade 14 withdraws via the slit 60 made in the relatively narrow jaw 78 whereas the handle 52 pivots about a pin 82 to a position shown in FIGS. 1 and 2 under a spring force generated by the spring 80.

[00025] Referring to FIG. 3, a motorized cable armor stripper 90 configured in accordance with another embodiment of the invention is configured in a manner essentially similar to the manually operated stripper 10. In particular, the armor stripper 90 has an elongate body 92 having a proximal portion thereof housing a rechargeable and/or replaceable battery 94 and distal portion provided with a motor 96 and a blade 98. Once the cable is properly positioned in a clamp 106 in a manner, as described above, increasing pressure on a handle 102 will bring a proximal end 104 of a leaf spring enveloped by the handle 102 in contact with a switch 100 actuating the motor 96. The leaf spring is riveted to a distal end 108 of the handle 102 thus preventing crushing of the cable casing by bowing against a body support 110.

[00026] When the motor 96 starts rotating, further compressing the handle 102 and the body 92 together brings the rotating circular blade 98 through the slit 60 in contact with the armored cable in the cutting position of the blade. As discussed in detail in reference to the manually operated cable armor stripper, as the pressure generated by the user is increase, the blade cuts through the armored cable until the desired depth of blade penetration is reached. Releasing the pressure brings back all the parts in the rest position of the blade and releases the processed cable.

[00027] FIG. 4 illustrates the another embodiment of the present invention configured to have the clamp 44 positioned with respect to the longitudinal axis of the body 12 at an angle differing from a right angle to produce a helical cut on the cable. Structurally the clamp 44 is provided with the upper 78 and lower jaw 76 bridged by a rear wall 118 (FIG. 2) which is inclined at the desired angle different from the right with respect to the longitudinal axis A-A. Since the cable to be cut extends along and presses against the rear wall 118, the desired angular position of the cable is easily established. The stripper of the present invention, thus, can be provided as a kit including differently shaped clamps 44 removably attachable to the body 12 by screws 112. A number of clamps 44 configured to establish a desired angle ranging from 90° to any angle including, for example 60°, can be provided in the kit for the user's convenience

[00028] The above description should not be construed as limiting, but merely as exemplifications of preferred embodiments. Those skilled in the art will envision other modifications within the scope and spirit of the claims appended hereto.